Section 3

Implementation Approach

Mike Rackley
Ground System/Ops Manager

Outline

- ***Implementation Approach***
- ***Reviews***
- ***Documents***
- ***Requirements Definition/Tree***
- ***Test/Ops Readiness Approach***
- ***Risk/Configuration Management***

Implementation Approach

- ***Ground system is comprised of many different elements and organizations, so it is critical to use a flexible strategy that facilitates the groups working as a team***
- ***Using collection of Ground System/Ops Reviews***
  - *SRR, PDR, CDR, MOR, ORR*
  - *Element teams directly participate and support these reviews*
- ***Ground system-level documents***
  - *Project Plan*
  - *Ground System Mission Assurance Requirements (MAR) Document*
  - *Operations Concept Document*
  - *Ground System Requirements Document (GSRD)*
  - *Ground System Test Plan*
  - *ICD's*
  - *Operations Agreement on Roles and Responsibilities*
  - *Mission Operations Readiness Plan*
  - *Operations Agreements*

Implementation Approach

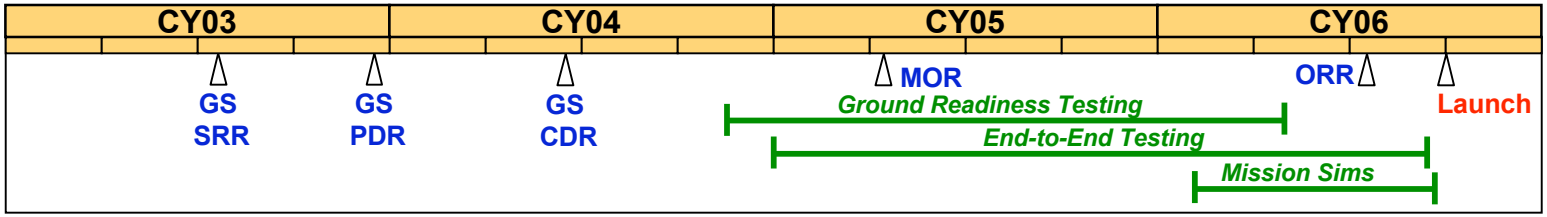
- ***Have an integrated ground system schedule that addresses schedules for each of the elements, ground system tests, mission simulations, documents, etc.***
  - *Schedule part of overall Project baseline schedule*
  - *Regularly reviewed with Project to ensure schedule changes are recognized and addressed*
  - *Routinely reviewed among ground system element teams*
- ***Using GLAST Operations Working Group (GOWG) to work ground system and operations topics***
  - *Schedule, status, technical issues, action items, etc.*
  - *Splinter teams assigned to work specific technical areas*
- ***Utilizing Ground System/Ops Web Site (under GLAST Project Web site) to facilitate information access/dissemination***
  - *Schedules, Org Chart, Contact List, Documents, Memos, etc.*

Implementation Approach

- ***Ground system team at Goddard work directly with elements***
  - *Element-level documentation review*
  - *Attendance at appropriate element-level reviews*
- ***Ensuring that ground system will meet NASA IT Security requirements***
  - *Plan to work with Code 290 early in development process*
  - *Need three IT Security Documents:*
    - *IT Security Plan, Contingency Plan, IT Risk Management Plan*
  - *Will be able to use Swift as a good model given similarity in architecture*
- ***Implementation approach documented in the Ground System Project Plan***

Ground System/Ops Reviews

Review	Purpose	Date	Main Documents
System Requirements Review (SRR)	Present the overall requirements of the ground system, along with the plan for managing and testing the system, schedules, etc.	July 2003	▸ Ground System Project plan ▸ Operations Concept Update ▸ Ground System Requirements Document
Preliminary Design Review (PDR)	Describes the preliminary design of the ground system as a whole, and at the element level. Describes current state of interface definitions.	Dec 2003	▸ Draft ICD's
Critical Design Review (CDR)	Describes the detailed design of the ground system as a whole, and at the element level. Describes in detail the interface definitions.	June 2004	▸ Final ICD's ▸ Ops Agreement for Roles and Responsibilities ▸ Ground System Test Plan
Mission Operations Review (MOR)	Describes how the process, people, and products will be made operationally ready for launch.	April 2005 (tbd)	▸ Mission Ops Readiness Plan
Operations Readiness Review (ORR)	Describes the state of ops readiness of the ground system, process, people, and products. Expectation: DONE	July 2006	▸ Final versions of Operations Manuals and Flight Operations Plan

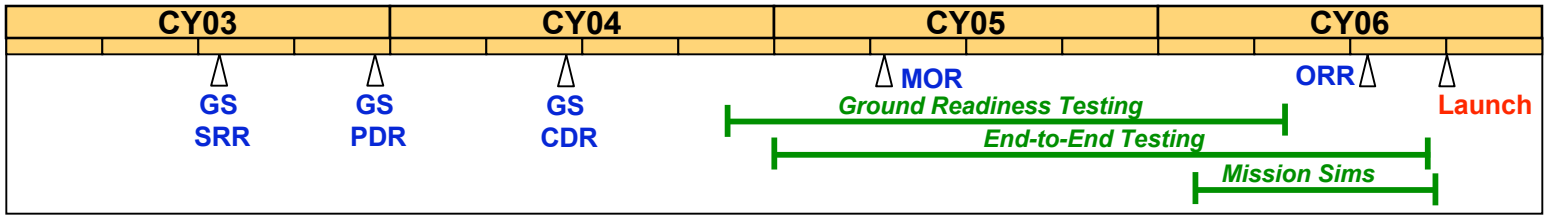


Ground System-Level Documents

Document	Purpose	Draft	Final	CCB
Ground System Project Plan	Describes approach to implementing and testing the overall ground system	June 2003	August 2003	Project
Ground System Mission Assurance Requirements Document	Agreement between the Project and Code 300 on how the ground system will be implemented and managed.		Baselined June 2003	Project
Operations Concept Document – Rev 1	Describes the operations approach and scenarios for the mission (normal operations) [Note: Original Baselined March '02]	April 2003	August 2003	Project
Ground System Requirements Document	Documents the Level 3 requirements for the complete ground system; traces to Mission System Spec, Operations Concept Document, ICD's etc.	May 2003	August 2003	Project
Ground System Test Plan	Describes approach to planning and coordinating the ground readiness and end-to-end tests	November 2003	May 2004	GS
Operations Agreement on Roles and Responsibilities	Defines the ops roles and responsibilities among Project, Spectrum, and instrument team personnel for preparing for launch	October 2003	June 2004 (GCDR)	GS
Mission Ops Readiness Plan	Provides a more detailed description of the approach to be taken to achieve operations readiness.	November 2004	April 2005 (MOR)	GS

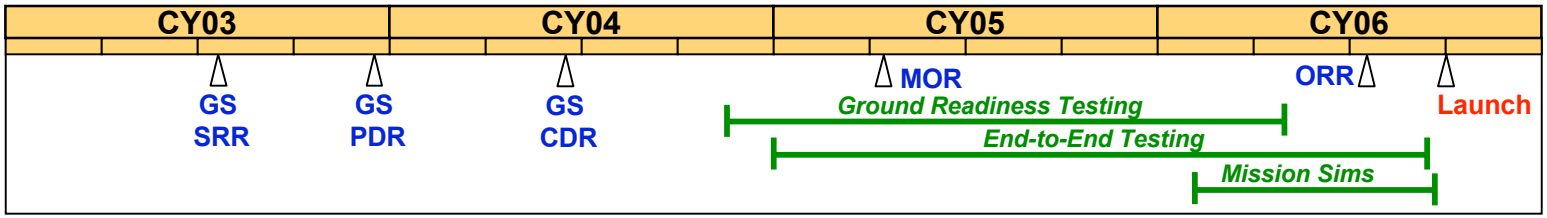
Ground System-Level Documents

Document	Purpose	Draft	Final	CCB
IT Security Plan	Describes how the entire ground system will meet IT Security Requirements defined in NPG 2810.1	GS PDR (Dec '03)	GS CDR (June '04)	GS
Contingency Plan	Describes how contingencies will be handled in terms of facilities and networks	GS PDR (Dec '03)	GS CDR (June '04)	GS
IT Risk Management Plan	Identifies MOC facility and IT security risks and how they will be addressed	GS PDR (Dec '03)	GS CDR (June '04)	GS
Project Service Level Agreement (PSLA) (or equivalent)	Defines requirements on CSOC and NISN (e.g., SN, FDF, CTV, voice & data communications). Will be covered under new CSOC replacement contract (MOMS).	tbd	tbd	MOMS

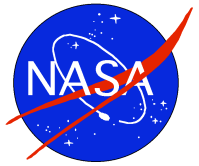


Ground System ICD's

Document	Lead	Draft	Final	CCB
Spacecraft/Ground Station (CDRL 4.1)	Spectrum Astro	SC CDR – 1 mos (Jan '04)	August '04	Project
Spacecraft/SN (CDRL 23)	Spectrum Astro/ Code 450	SC CDR – 1 mos (Jan '04)	August '04	Project
Spacecraft/MOC (CDRL 4.2)	Spectrum Astro	SC CDR – 1 mos (Jan '04)	GDS CDR (June'04)	Project
MOC/GSSC	MOC	GDS PDR (Dec '03)	GDS CDR (June '04)	GS
MOC/LAT IOC	MOC	GDS PDR (Dec '03)	GDS CDR (June '04)	GS
MOC/GBM IOC	MOC	GDS PDR (Dec '03)	GDS CDR (June '04)	GS
GSSC/IOC	SSC	GDS PDR (Dec '03)	GDS CDR (June '04)	GS
MOC/FDF	Code 595/ MOMS	GDS PDR (Dec '03)	GDS CDR (June '04)	GS



Institutional ICD's

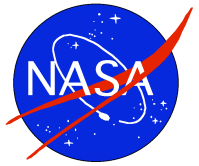


- ***SN***
  - *DAS to DAS Customers ICD (453-ICD-DAS/Customer)*
  - *ICD Between the NCC Data System and MOCs (451-ICD-NCCDS/MOC)*

Test Approach

- ***Overall ground system testing approach/plan documented in the Ground System Test Plan***
- ***RF interface compatibility testing to be done at spacecraft contractor facility (Gilbert, AZ) – 4 tests allocated, 5 days each***
  - *CTV for TDRSS, RF Suitcase for ground stations (see diagram)*
- ***Ground system functionality, performance and interfaces validated via series of Ground Readiness Tests (GRT's)***
  - *Series of 7 ground tests, with all requirements planned for testing in first 5*
  - *Supported by simulators and recorded observatory data*
- ***Science tools reviewed/analyzed by GLAST User's Committee***
  - *Peer reviews of the science tools/algorithms (design, planned functionality)*
- ***Also have 5 End-to-End Tests (2 days each) with observatory***
  - *With MOC workstations at spacecraft facility and with actual MOC at Goddard*
  - *Initial tests between MOC and Observatory…later tests bring in other ground system elements*

Operations Readiness Approach



- ***Planning for, achieving, and proving overall operations readiness responsibility of GLAST Ground System/Operations Manager***
  - *Ground System, Products, Personnel, and Processes*
- ***Operations Agreement for Roles and Responsibilities* to document roles, etc. of Project, FOT, Spectrum, and Instrument Team personnel**
- ***Mission Operations Readiness Plan* to document detailed plans for achieving operations readiness (e.g., operations product development/validation,**
- ***Operations Reviews:***
  - *Mission Ops Review (MOR) will present plan for achieving ops readiness*
  - *Operations Readiness Review (ORR) will present evidence that we are operationally ready for launch*
- ***Readiness of operations team, products and processes to be validated via a series of Mission Simulations and L&EO Rehearsals***
  - *Utilizes combination of simulators, recorded data, and actual observatory*

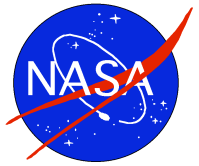
Risk Management

- ***Ground system covered as part of Project's Risk Management system and process***
  - *Project Risk Management Program documented in Project Risk Management Plan*
  - *Project convenes bi-weekly risk management meetings among Senior Staff (Risk Management Board) to status existing risks and discuss/evaluate newly identified risks*
  - *Risks that have become a current problem are elevated to the Project "Top 10" Open Issues list – which are also reviewed bi-weekly*
- ***Lower level risks worked via the GLAST Ops Working Group (GOWG)***
  - *When a risk is identified, a GOWG action item is assigned*
  - *Action items reviewed at GOWG meetings at least every 2 weeks*
  - *Main criteria for elevating a risk to the Project-level is the potential for impacting the budget and/or schedule*
- ***Ground System Project Plan describes this risk management approach for the ground system***

Configuration Management

- ***Ground system participates in Project-level Configuration Control Board (CCB)***
  - *Project configuration management (CM) process documented in Project CM Plan*
  - *CM process supported by online, Web-based system*
  - *Project-level CCB used to baseline documents that directly affect contracts (e.g., MOC SOW) and that have broad Project-level application (e.g., GLAST Project Plan, Configuration Management Plan, Risk Management Plan)*
- ***Ground system-level CCB used to baseline and control documents that only affect the ground system***
  - *Chaired by Ground System/Ops Manager, with CCB membership comprised of element team leads, ground system engineers, and representatives from Systems Management team*
  - *Used to baseline documents such as ground system ICD's, Ground System Test Plan, Mission Operations Readiness Plan, Operations Agreements, and element-level Requirements Documents*
  - *Plan to use same system as the Project CM system*

Configuration Management



- ***Element-level documents covered under that element's CM system and process, with insight and review from rest of ground system team***
  - *Examples: Development plans, design documents, release plans, CM Plans*
- ***Ground System Project Plan describes this configuration management approach for the ground system***